GALATON, Ye.G.

Major repair of the eighth group of soaking pits at the Zaporozhstal' rolling mill. Met. i gornorud. prom. no.3: 64-65 My-Je '64. (MIRA 17:10)

CHERNYATIN, A.N.; OSTROUKHOV, M.Ya.; GIMMEL'FARB, R.A.; VOLKOV, Yu.P.; BABARYKIN, N.N.; SHPARBER, L.Ya.; GALATONOV, A.L.

Mastering of MMK [Magnitogorsk Metallurgical Combine] blast furnace operations with the use of natural gas. Metallurg 10 no.8:12-13 Ag '65. (MIRA 18:8)

1. Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii i Magnitogorskiy metallurgicheskiy kombinat.

BARDIN, I.P., akad. [deceased]; KULIKOV, I.S; ZUDIN, V.M.; TSYLEV, L.M.; SOKOLOV, G.A.; GALATONOV, A.L.; BABARYKIN, N.N.; GUL'TYAY, I.I.

Making low-sulfur cast iron at the Magnitogorsk Combine. Stal' 20 no.10:865-869 O '60. (MIRA 13:9)
(Magnitogorsk--Blast furnaces) (Cast iron--Metallurgy)

GALATONOV, A L.

18(5) PHASE I BOOK EXPLOITATION SOV/1247

Dostizheniya domenshchikov Magnitogorskogo metallurgicheskogo kombinata (Achievements of Blast Furnace Operators of the Magnitogorsk Metallurgical Combine) Moscow, Metallurgizdat, 1957. 279 p. 3,000 copies printed.

Ed.: Bannykh, A.I., Professor; Ed of Publishing House: Yablonskaya, L.V.; Tech. Ed.: Attopovich, M.K.

PURPOSE: This book is intended for engineers, foundry foremen, and personnel in research institutes. It may also be useful to students and others interested in foundry practice.

COVERAGE: This book deals with achievements of the foundries of the Magnitogorsk Metallurgical Combine. The processes of preparing the charge, melting and pouring are described. Improvements in foundry methods and the theory behind these improvements are presented with numerous graphs and illustrations. The book is the combined effort of the following authors: Foreword: Bannykh, A.M. (editor); Introduction, parts 1 and 2: Bannykh, A.M.; part 3 by

Card 1/6

Achievements of Blast Furnace Operators (Cont.) SOV/1247

Stefanovich, M.A.; Chapter I, part 1 by Dorogobid, G.M.; part 2 by Shitov, I.S.; part 3 by Yakobson, A.P.; Chapter II, part 1, 2, and 3 by Galatonov, A.L.; part 4 by Bannykh, A.M. and Nayasov, A.G.; Chapter III, Galatonov, A.L. and Golchin, V.I.; Chapter IV, parts 1,2,3,4,5 and 6 by Galatonov, A.L.; part 7 by Stefanovich, M.A.; Chapter V by Stefanovich, M.A.; Chapter VI by Babarykin, N.N.; Chapter VII by Shastin, V.A.; Chapter VIII by Gornostayev, V.K. There are 51 references, of which 43 are Soviet, and 8 are English.

TABLE OF CONTENTS:

Foreword 5

Introduction. 1. Brief description of a blast furnace 7

2. Results of technical and economic achievements of the blast furnace shop, 1950 to 1955 8

Card 2/6

3. The nature of processes in a blast furnace 16

Ch. I. Preparation of Raw Material and Fuel for Blast Furnace Operation 36
1. Method of coking 36
2. Blending of ore 68
3. Agglomerate plants and preparation of agglomerate 79

Ch. II. Flux-bearing Agglomerate 87
1. The use of flux-bearing agglomerate in the charge of a blast furnace 87
2. Quality of highly basic flux-bearing agglomerate 91
3. Results of blast furnace performace with flux-bearing agglomerate 92
4. Theoretical principles and reasons for using flux-bearing agglomerate 97

BANNYKH, A.M - NAYASOV, A.G.

GALATONOV, A.L. and GOLCHIN V.I.

Ch. III. Elimination of Manganese Additives from the Charge and the Production of Low Manganese Cast Iron 113
1. Productivity of the blast furnace and coke requirements 115
2. Quality of pig iron 117
3. Economic results 126

Ch. IV. Increased Pressure of Blast Furnace Gas 128
1. Application of increased top pressure 128
2. Plan for a changing over of blast furnaces to increased top pressure 129
3. Operation of blast furnaces with increased top pressure 134
4. Control and measuring instruments and their readings 137
5. Special features in the operation of blast furnaces with increased top pressure 140
6. Changes in the distribution of the charge materials in the stack 142
7. Theoretical principles of blast furnace operation with increased top pressure 146

Achievements of Blast Furnace Operators (Cont.) SOV/1247

Ch. V. Application of Blowing With Increased and Controlled Amounts of Moisture and Increased Heat (Temperatare) 175
1. The role of hydrogen and water vapors in blast furnaces 175
2. Results of using blowing with variable amount of moisture 182
3. Direction of changes in moisture content (from normal to optimum) 191
4. The importance of high temperature blowing in relation to changes in the blast furnace processes 193

BABARYKIN, N.N.

Ch. VI. Controlling Blast Furnace Operations From the Top 210
1. Analysis of motion and distribution of charge materials in the stack 212
2. Characteristics of the basic principles in controlling blast furnace operations from the top 229
3. The use of principles of controlling the blast furnace from the top for the elimination of certain troubles in the functioning of blast furnace 237

Card 5/6

Achievements of Blast Furnace Operators (Cont.) SOV/1247

SHASTIN V.A.
Ch. VII. Constructional Improvements of Blast Furnace Shop Equipment 248
1. Loading arrangement for blast furnaces 248
2. Receiving hopper 250
3. Hot air duct equipment 255
4. Arrangement for removal of melt products 261
5. Overhaul of blast furnaces 261

GORNOSTAYEV V.K.
Ch. VIII. The Role of the Blast Furnace Foreman 266
1. The Magnitogorsk school for foremen 266
2. Foreman -- a blast furnace technologist 267
3. Foreman as the organizer of work at a blast furnace 274
4. Uniform working methods for the various shifts 276

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GO/ksv
3-10-59

Card 6/6

GALATONOV, A.L.

Using shielded nozzles in blast furnaces at the Magnitogorsk Metallurgical Combine. Biul. TSNIICHM no.15:36-37 '57. (MIRA 11:5)

1. Magnotogorskiy metallurgicheskiy kombinat.
(Magnitogorsk--Blast furnaces)

ZUDIN, V.M.; BABARYKIN, N.N.; GALATONOV, A.L.; KULIKOV, I.S.

Effect of magnesium on the desulfurizing properties of blast furnace slags. Stal' 21 no.5:385-391 My '61. (MIRA 14:5)

1. Magnitogorskiy kombinat i Institut metallurgii AN SSSR.
(Desulfuration)

RUDNEVA, A.V.; MALYSHEVA, T.Ya.; SOKOLOV, G.A.; GUL'TYAY, I.I.;
Prinimali uchastiye: GALATONOV, A.L.; GAMAYUROV, A.I.;
BABARYKIN, N.N.; KOSTIN, I.M.

Changes in the material composition of industrial sinter along the cake height. Stal' 22 no.1:5-9 Ja '62. (MIRA 14:12)

1. Institut metallurgii imeni A.A. Baykova (for Rudneva, Malysheva, Sokolov, Gul'tyay). 2. Magnitogorskiy metallurgicheskiy kombinat (for Galatonov, Gamayurov, Babarykin, Kostin).
(Sintering)

ZUDIN, V.M.; SAGAYDAK, I.I.; YAKOBSON, A.P.; BABARYKIN, N.N.; DORMAN, V.G.; GALATONOV, A.L.; LEKIN, P.V.

Preparation of screened sinter and its use in blast furnace smelting. Stal' 22 no.8:675-679 Ag '62. (MIRA 15:7)

1. Magnitogorskiy metallurgicheskiy kombinat.
(Sintering)
(Blast furnaces--Equipment and supplies)

ZUDIN, V.M.; YAKOBSON, A.P.; KOSTIN, I.M.; GALATONOV, A.L.; GAMAYUROV, A.I.; TSVERLING, A.L.; MALYSHEVA, T.Ya.; SOKOLOV, G.A.; RUDNEVA, A.V.; TSYLEV, L.M.; GUL'TYAY, I.I.

Effect of the sintering temperature on the mineralogical composition of sinter and its metallurgical properties. Stal' 23 no.6:481-485 Je '63. (MIRA 16:10)

1. Magnitogorskiy metallurgicheskiy kombinat i Institut metallurgii im. A.A.Baykova.

GALATONOV, A.L.

Effect of the temperature of the blow on the technical, economic, and technological indices of blast furnace smelting. Stal' 23 no.10:869-874 O '63. (MIRA 16:11)

1. Magnitogorskiy metallurgicheskiy kombinat.

GALATONOV, A.L. (Magnitogorsk)

Influence of basicity and viscosity of slag on its desulfurizing capacity in a blast furnace. Izv. AN SSSR. Met. i gor. delo no.6:48-57 N-D '64. (MIRA 18:3)

GALATONOV, A.L.

Effect of basicity and viscosity of slag on its desulfurizing ability in blast furnace processes. Stal' 24 no.6:492-497 Je '64. (MIRA 17:9)

1. Magnitogorskiy metallurgicheskiy kombinat.

BABARYKIN, N.N.; GALATONOV, A.L.; SAGAYDAK, I.I.; SHPARBER, L.Ya.; TSVERLING, A.L.; YAKOBSON, A.P.; BORTS, Yu.M.; ZHILO, N.L.; KOPYRIN, I.A.; OSTROUKHOV, M.Ya.

Experimental smelting with a reduced slag output. Stal' 24 no.12:1069-1075 D '64. (MIRA 18:2)

1. Magnitorskiy metallurgicheskiy kombinat i Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii.

AGASHIN, A.A.; BABARYKIN, N.N.; VOLKOV, Yu.P.; GALATONOV, A.L.; KRYUKOV, N.M.; MALIKOV, K.V.; OSTROUKHOV, M.Ya.; PISHVANOV, V.L.; CHERNYATIN, A.N.; YUSHIN, F.A.

Experimental operation of blast furnaces on mazut and natural gas. Stal' 25 no.5:393-400 My '65. (MIRA 18:6)

1. Magnitogorskiy metallurgicheskiy kombinat; Vsesoyuznyy nauchno-issledovatel'skiy institut metallurgicheskoy teplotekhniki i Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii.

CHEKMAREV, A.P., akademik; MELESHKO, V.I., kand.tekhn.nauk; PAVLOV, V.L., kand.tekhn.nauk; CHEKHRANOV, V.D., kand.tekhn.nauk; GALATOV, N.S., inzh.; LIKHORADOV, A.P., inzh.

Blooming mill operations with individual roll drives. Trudy Inst. chern. met. AN URSR 15:177-188 '61. (MIRA 15:2)
(Rolling mills--Electric driving)

CHEKMAREV, A.P., akademik; TAYTS, N.Yu., prof., doktor tekhn.nauk; GALATOV, N.S., inzh.; GETMANETS, V.V., inzh.; SINITSA, I.I. [illegible]nzh.; MINAYEV, A.N., kand.tekhn.nauk; GUBINSKIY, V.I., inzh.; GO[illegible]AROV, Yu.V., inzh.

Reduction of scale formation on continuous wire rod rolling mills. Stal' 22 no.4:327-330 Ap '62. (MIRA 15:5)

1. Dnepropetrovskiy metallurgicheskiy institut i Krivorozhskiy metallurgicheskiy zavod.
(Rolling (Metalwork)) (Wire--Corrosion)

GALATOV, N.S., inzh.; ZHURAVLEV, I.P., inzh.; NETREBKO, P.G., inzh.

Operation of blast furnaces with a capacity of 2.000 m^3.
Met. i gornorud. prom. no.5:3-8 S-O '63. (MIRA 16:11)

GALATOV, N.S.

New equipment and modern technology at the Lenin Metallurgical Plant in Krivoy Rog. Met.i gornorud. prom. no.6:3-6 N-D '63. (MIRA 17:2)

1. Direktor Krivorozhskogo metallurgicheskogo zavoda imeni Lenina.

PIROGOV, A.A.; RAKINA, V.P.; KRASS, Ya.R.; VOLKOV, N.V.; BELICHENKO, G.I.; GALATOV, N.S.; NESTEROVA, A.L.; KORKOSHKO, N.M.; YEL'TSOV, V.V.

Dolomite magnesite blocks for lining oxygen-blown converters. Ogneupory 30 no.9:4-5 '65. (MIRA 18:9)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov (for Pirogov, Rakina, Krass, Volkov, Belichenko).
2. Krivorozhskiy metallurgicheskiy zavod (for Galatov, Nesterova, Korkoshko, Yel'tsov).

GALATOV, N.S.; NESTEROVA, A.L.; KUDRINA, A.P.; GUL'YEV, G.F.; BASHLIY, V.I.

Industrial production of dolomite refractories with a resin binder and their service in 50-ton converters. Met. i gornorud. prom. no.6:42-45 N-D '65. (MIRA 18:12)

PROKOPENKO, A.G., inzh.; GORESHNIK, A.D., inzh.; TKACHUK, N.V., inzh.; BRAGINSKIY, V.A., inzh.; GALATSAN, V.N., inzh.; MAKHLIN, V.A., inzh.

Analysis of the start operation of warm 150 Mw. single-block units. Teploenergetika 10 no.8:2-10 Ag '63. (MIRA 16:8)

1. Yuzhnoye otdeleniye Gosudarstvennogo tresta po organizatsii i ratsionalizatsii rayonnykh elektrostantsiy i setey, Khar'kovskiy turbogeneratornyy zavod i Gosudarstvennoye upravleniye energeticheskogo khozyaystva Dnepropetrovskoy oblasti.
(Boilers) (Steam turbines)

L 22148-66 EWP(f)/T-2/ETC(m)-6 WW
ACC NR: AP6012950 SOURCE CODE: UR/0096/65/000/011/0002/0012

AUTHOR: Kosyak, Yu. F. (Engineer); Galetsan, V. N. (Engineer); Shilin, Yu. P. (Engineer); Polyakov, V. S. (Engineer); Abramenko, O. B. (Engineer); Nosyl'ko, D. R. (Engineer)

ORG: KHTGZ, ORGRES, Pridneprovskaya GRES

TITLE: First experience in starting and operation of a pilot model of the K-300-240-KhTG3 turbine

SOURCE: Teploenergetika, no. 11, 1965, 2-12

TOPIC TAGS: thermoelectric power plant, electric rotating equipment

ABSTRACT: Since the end of 1963, a combined team from ORGRES (Moscow), the Khar'kov Turbine Plant and the Pridneprovskaya GRES have been working to develop and test starting, load and stopping regimes for a 300 Mw power unit consisting of the TPP-110 boiler and the K-300-240-KhTGZ turbine. During the initial and most subsequent startups, the temperature states of the steam conduits and the turbine were monitored with both standard control-measurement devices and special thermocouples placed for the investigations. Starts were performed from the cold, hot and intermediate states. The article presents a cross section of the turbine, steam-flow chart during startup, a diagram of the locations of thermocouples in the turbine during testing, and startup graphs for the various states. A recommended startup schedule from the cold

Card 1/2 UDC: 621.165.001.42.001.5

L 22148-66
ACC NR: AP6012950

state is presented in graphic form. The authors conclude that the graph represents a startup regime which is satisfactory for cold starting of the unit, but make several concrete recommendations for areas of caution or improvement. It was found that the cooling of the unit does not result in over-standard temperature or dimensional differences at any time, so that startup from partially-cooled states is always possible. / Orig. art. has: 9 figures. [JPRS]

SUB CODE: 10, 13 / SUBM DATE: none / ORIG REF: 002

Card 2/2 dda

GALATSKAYA, S.Z., red.; KOLEGOVA, V.A., red.; DMITRIYEVA, N.M., red.; CHULKOV, I.F., tekhn. red.

[Organization of outpatient psychoneurological care for children and adolescents] Opyt organizatsii vnebol'nichnoi psikhonevrologicheskoi pomoshchi detiam i podrostkam. Moskva, Medgiz, 1963. 191 p. (MIRA 16:5)
(CHILDREN--DISEASES) (NEUROSES) (PSYCHIATRIC CLINICS)

GALATSKIY, B.D.

15248* Allowance for Deformation Rate When Tensile Testing Aluminum Alloy Sheets. Ob uchete skorosti deformatsii pri ispytanii na rastiazhenie listov iz aliuminievykh splavov. (Russian.) F. V. Tuliankin and B. D. Galatskii. *Zavodskaia laboratoriia*, v. 21, no. 8, Aug. 1955, p. 975-979.

Relation of critical rate of deformation to tensile strength for variously heat-treated specimens of Al alloys, and of tensile strength and relative elongation to test rate. Graphs, tables. 5 ref.

(1)

S/137/62/000/005/123/150
A160/A101

AUTHORS: Galatskiy, B. D., Tulyankin, F. V., Fridlyander, I. N.

TITLE: The determination of the duration of quenching heating for attaining the maximum tensile-strength values in relation to the temperature of quenching and the coefficient of drawing of pressed products from Д 1 (D1) alloy

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 129, abstract 5I787 (V sb. "Deformiruyemyye alyumin. splavy". Moscow, Oborongiz, 1961, 59 - 63).

TEXT: The investigation was carried out with products made from D1 Al-alloy and pressed out at 380 - 400°C with a coefficient of drawing from 2.8 to 170. The pieces were quench-heated in a potassium nitrate bath of up to 460 - 510°C for a period ranging from 1 minute to 15 hours. Presented is a formula determining the duration of quenching heating τ_{max} necessary for obtaining the maximum values of σ_b:

$$\tau_{max} = 2^{\frac{510-t_3}{10}} (10^4/f \cdot \lambda^2),$$

Card 1/2

S/137/62/000/005/123/150
A160/A101

The determination of...

where t_3 = the temperature of quenching, λ = the drawing coefficient, $f = P_{prof}/P_f$ (P_{prof} = the perimeter of the profile, P_f = the circumferential length of the rod under equality conditions of the sections $F_{prof} = F_f$; for the rods f = 1, and for the profiles f >·1). It has been established that the regularity of change of $\sigma_{0.2}$ in relation to λ, the temperature and τ_{max} is completely analogous to the regularity of change of σ_b.

A. Babayeva

[Abstracter's note: Complete translation]

Card 2/2

35082

S/[illegible]/000/000/011/[illegible]
D205/D303

18.1210 (2402)

AUTHOR: Galatskiy, B.D.

TITLE: Causes of weakening of thin-wall duralumin profiles as a function of the hardening conditions

SOURCE: Fridlyander, I.N., V.I. Dobatkin, and Ye.D. Zakharov, eds. Deformiruyemyye alyuminiyevyye splavy; sbornik statey. Moscow, 1961, 85 - 94

TEXT: Industrial practice has shown that the cause of low strength encountered at times in thin wall profiles of [illegible] 1 and [illegible] 16 (D1 and D16) alloys is connected mainly with an unsuitable heating regime before hardening. The present work is an investigation of the changes of mechanical properties as a function of the time-temperature characteristics of the heating prior to hardening. A hot-pressed equally sided corner 20 x 20 x 2 mm of D1 alloy of the following composition: Cu - 4.29, Mg - 0.53, Mn - 0.60, Fe - 0.32, Si - 0.30 and the rest Al, was employed for the investigation. Non-homogenized ingots were pressed at 380°C. The degrees of drawing and deformation were 5- and

Card 1/4

Causes of weakening of thin-wall ...

97.2 % respectively. The temperatures of hardening were 460, 470, 480 490, 500 and 510°C and the heating times at the indicated temperatures were 0.5, 1, 3, 5, 7, 10, 15, 30, 120 and 300 minutes. After a 7 day ageing the samples were cut out and used for the mechanical tests. The time-temperature dependence of the tensile strength is given in a figure. The relative elongation increased with both time and temperature of the heat treatment before hardening. Investigation of the microstructure has shown that the thickness of the recrystallized layer can be expressed by $a_r = 0.05\ \tau^n$ where a_r = thickness of the recrystallized layer in mm, τ = time of heating before hardening in min., and n is given by

$$n = \frac{1}{2.13 - 0.03(t_3^o - 460)}, \qquad (2)$$

where t_n is the hardening temperature in °C. X-ray investigation has shown that at 500°C and 10 minutes only the deformation texture exists, after 15 minutes the recrystallisation structure begins to appear and becomes predominant at higher heating times. At the harden-

Card 2/4

Causes of weakening of thin-wall ...

ing temperature of 480°C the recrystallization structure begins to appear after 2 hours. The time needed for complete recrystallization at every temperature can be computed from $t_h = 540\ \tau_{cr}^{-0.025}$ where τ_{cr} is the time of complete recrystallization in min. Investigation of the microhardness has shown that in the first minutes of heating a rapid dissolution of the finely dispersed phases takes place which causes a sharp increase in the microhardness; after 15 - 30 minutes the increase is very slow. Increasing the temperature results also in the increase of microhardness. Three factors are involved in the heating for hardening: 1) Strengthening, caused by the saturation of the solid solution; 2) Weakening caused by the growth of the recrystallized layer; 3) Weakening caused by grain growth in the layer. The maximum saturation effect is achieved at short times where the recrystallization weakening is still low. Therefore a shortening of the presently employed heating times of 20 - 30 minutes after the desired temperature has been reached is envisaged. The best results were obtained by heating the D1 and D16 profiles to 490°C and immediate hardening. Under these conditions the tensile strengths achie-

Card 3/4

ved were 45.1 and 45.5 kg/mm^2 and the relative elongations 17.2 and 16.2 % for D1 and D16 respectively. There are 7 figures, 2 tables and 2 Soviet-bloc references.

Card 4/4

S/689/61/000/000/012/0[illegible]
D205/D305

AUTHORS: Galatskiy, B.D., Tulyankin, F.V., and Fridlyander, I.N.

TITLE: Methods of improving the mechanical properties of pressed profiles and rods of the [illegible] 16 (D16) alloy

SOURCE: Fridlyander, I.N., V.I. Dobatkin, and Ye.D. Zakharov, eds. Deformiruyemyye alyuminiyevyye splavy; sbornik statey, Moscow, 1961, 95 - 105

TEXT: The main cause of weakening is the formation of a coarse-grained structure. Examination of 450 batches of pressed profiles having a wall thickness of 5 mm has shown that 22.4 % of the batches had worse mechanical properties than those specified. The following measures are recommended for improving the quality of the industrial products: Use of precise chemical composition for D16 (3.8 - 4 % Cu, 1.4 - 1.6 % Mg, 0.7 - 0.9 % Mn; Fe and Si impurities not more than 0.5 % each, Zn not more than 0.2 %) ensures a uniformity in the mechanical properties and prevents the formation of a coarse-grained

Card 1/2

Methods of improving the mechanical ...

structure. The pressing of the small and medium profiles has to be done at the ingot temperature of 370 - 380°C and for the larger profiles at 410 - 420°C. This ensures a better quality of the profile surface and increases the productivity of the process. There are 3 figures and 3 tables and 5 Soviet-bloc references.

Card 2/2

S/123/62/000/013/003/021
A004/A101

AUTHORS: Galatskiy, B. D., Tulyankin, F. V., Fridlyander, I. N.

TITLE: Ways of improving the mechanical properties of pressed shapes and bars from the Д 16 (D16) alloy

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 13, 1962, 22, abstract 13A141 (In collection: "Deformiruyemyye alyumin. splavy". Moscow, Oborongiz, 1961, 95 - 103)

TEXT: It is pointed out that, to obtain a high level and stability of mechanical properties and to prevent the formation of a macro-crystalline structure in shapes and bars of the D16 alloy, a more accurate chemical composition of the D16 alloy is necessary (3.8 - 4% Cu, 1.4 - 1.6% Mg, 0.7 - 0.9% Mn, 0.2% Zn, Si + Fe up to 0.5%). Small and medium-size shapes should be pressed at a temperature of 370 - 380°C, large shapes at 410 - 420°C.

[Abstracter's note: Complete translation]

Card 1/1

S/129/62/000/011/002/007
E193/E383

AUTHORS: Galatskiy, B.D., Engineer and Fridlyander, I.N., Doctor of Technical Sciences, Professor

TITLE: Determination of the heating time during the solution-treatment of extruded duralumin parts

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no. 11, 1962, 13 - 17

TEXT: The mechanical properties of solution-treated and, consequently, of age-hardened duralumin depend on the time at the solution-treatment temperature. The object of the present investigation was to determine the optimum value of this parameter in the heat-treatment of extruded duralumin parts. Analysis of experimental data for extruded rods of alloys Д1 (D1) and Д16 (D16) (with average analysis 4.3% Cu, 0.6 and 1.5% Mg and 0.6% Mn) showed that the heating time, τ_{max}, ensuring the maximum UTS of the alloy, increases with decreasing solution-treatment temperature, t_z, and reduction, λ, attained in extrusion. This relationship is described by

Card 1/4

Determination of ....

$$\tau_{max} = 2\,\frac{510 - t_3}{10} \cdot \frac{10^4}{\lambda^2} \qquad (1)$$

It was found, however, that Eq. (1) was not applicable to extruded shapes, τ_{max} in this case being considerably shorter than that for rods extruded to the same λ. A series of comparative tests was therefore conducted on rods and shapes of the same cross-section, extruded simultaneously to the same λ, through a single multihole die. The results showed that:

$$\frac{\tau^{\circ}_{max}}{\tau^{prof}_{max}} = \frac{P_{prof}}{P_{\circ}} \qquad (2)$$

where τ°_{max} is τ_{max} of a rod, τ^{prof}_{max} is τ_{max} of a profile with the same cross-sectional area and P_{prof}, $P_{\circ}$ denote, respectively, circumference of the rod and profile section. The term "shape coefficient" was ascribed to the ratio:

Card 2/4

Determination of ....

$$\frac{P_{prof}}{P_{\varnothing}} = \varnothing \qquad (2a)$$

and Eq. (1) became:

$$\tau_{max} = 2^{\frac{510-t_3}{10}} \cdot \frac{10^4}{\varnothing \cdot \lambda^2} \qquad (3)$$

where $\varnothing = 1$ for rods and is greater than 1 for other shapes. The results of the next series of experiments showed that τ_{max} depended also on the Cu, Mg and Mn content of the alloy, the effect of Mn being most pronounced. Analysis of the experimental results showed that if the effect of the variation in the Mn content was taken into account, formulae (2) became:

Card 3/4

Determination of ....

$$\tau_{max} = 2^{\frac{\%Mn-0.6}{0.1}} \cdot 2^{\frac{510-t_3}{10}} \cdot \frac{10^4}{\delta \cdot \lambda^2} \qquad (7)$$

There are 6 figures and 1 table.

Card 4/4

ACCESSION NR: AT4037667 S/2981/64/000/003/0263/0270

AUTHOR: Galatskiy, B. D.; Afanas'yeva, I. S.; Fridlyander, I. N.

TITLE: A study of the rate of Cu, Mg and Mn diffusion in aluminum in relation to the degree of deformation during extrusion

SOURCE: Alyuminiyevy*ye splavy*, no. 3, 1964. Deformiruyemy*ye splavy* (Malleable alloys), 263-270

TOPIC TAGS: aluminum alloy, duralumin, alloy Al, alloy D16, copper diffusion, manganese diffusion, magnesium diffusion, component diffusion analysis, extrusion related diffusion, temperature diffusion dependence, deformation, aluminum extrusion

ABSTRACT: Samples (150 mm long) cut from hexagonal bars extruded at 380C from twinned ingots (see Fig. 1 in the Enclosure) of alloys A1 and D16 (containing, respectively, in %: 0.015 - 4.1 Cu, 0.016 - 1.62 Mg, 0.008 - 0.44 Mn, 0.19 - 0.43 Fe, 0.18 - 0.36 Si) were preheated for 10^2 to 10^5 sec. in a niter bath at 470, 490 or 510C and spectrally analyzed along diagonal sections (1° to 1°30') to determine depth of diffusion and dependence of diffusion coefficients on temperature and coefficients of elongation ($\lambda = 3.7$, 10.0, 21.0 and 47.0). Results are tabulated (see Table 1 in the Enclosure) and indicate that the

Card 1/4

ACCESSION NR: AT4037667

diffusion coefficient D, expressed as $D = D_1 \cdot \lambda^n$ (where D_1 is the diffusion coefficient of the cast material and n is an exponent), is governed principally by D_1 at small degrees of deformation and by the degree of deformation as λ increases. Orig. art. has: 3 tables and 8 graphs.

ASSOCIATION: None

SUBMITTED: 00 DATE ACQ: 04Jun64 ENCL: 02

SUB CODE: MM NO REF SOV: 006 OTHER: 003

2/4

Card

ACCESSION NR: AT4037667

ENCLOSURE: 01

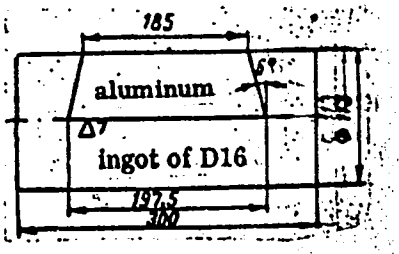

Fig. 1 - Twinned ingot of D16 and Al

Card 3/4

ACCESSION NR: AT4037667

ENCLOSURE: 02

Mean values of the diffusion coefficients D $\left(\frac{cm^2}{sec}\right)$ of Cu, Mg and Mn from D16 into aluminum

Temperature, °C	Component	Coefficient of elongation λ			
		3,7	10,0	20,0	47,0
510	Cu	$1,7\times10^{-10}$	$5,0\times10^{-10}$	$1,6\times10^{-9}$	$5,5\times10^{-9}$
	Mg	$3,1\times10^{-10}$	$5,0\times10^{-10}$	$9,6\times10^{-10}$	$2,9\times10^{-9}$
	Mn	$3,6\times10^{-10}$	$7,7\times10^{-10}$	$2,8\times10^{-9}$	$8,3\times10^{-9}$
490	Cu	$1,0\times10^{-10}$	$2,3\times10^{-10}$	$6,3\times10^{-10}$	$2,0\times10^{-9}$
	Mg	$2,7\times10^{-10}$	$3,8\times10^{-10}$	$6,5\times10^{-10}$	$1,6\times10^{-9}$
	Mn	$1,8\times10^{-10}$	$3,7\times10^{-10}$	$1,0\times10^{-9}$	$3,0\times10^{-9}$
470	Cu	$5,2\times10^{-11}$	$9,0\times10^{-11}$	$2,4\times10^{-10}$	$7,2\times10^{-10}$
	Mg	$2,0\times10^{-10}$	$2,5\times10^{-10}$	$4,1\times10^{-10}$	$9,7\times10^{-10}$
	Mn	$9,9\times10^{-11}$	$1,5\times10^{-10}$	$3,6\times10^{-10}$	$9,9\times10^{-10}$

Card 4/4

GALATSKIY, I.Yu., inzh.

Choice of optimum operating modes of an electric power plant with equipment set up for two pressures. Elek. sta. 35 no. 4:7-9 Ap '64. (MIRA 17:7)

GALATSLY, V.F. Cand Agr Sci -- (diss) "System of irrigating winter wheat under conditions of the Sunzha-Assa interriver area of the Chechen-Ingushskaya ASSR."

Ordzhonikidze, 1957. 18 pp 23 cm. (Min of Water Resources RSFSR. Southern Sci Res Inst of Hydraulic Engineering and Amelioration). 150 copies. (KL, 23-57, 114)

-97-

89

GALAUKO, A.A.; YUKHO, I.A.; MURNEU, A., redaktor; KALECHYTS, G., tekhnicheskiy redaktor.

[The local soviets are the organizers of collective farm production; work practices of local soviets of White Russia (1953-1956)] Miastsovyia Sovety arganizatary kalhasnai vytvorchastsi; z vopytu raboty miastsovykh Sovetau Belarusi (1953-1956 hh). Minsk, Dziarzh.vyd-va BSSR, 1957. 134 p. (MIRA 10:11)
(White Russia--Soviets) (White Russia--Collective farms)

GALAVACH, Alyaksandra.

Exhibition of flowers. Rab.i sial. 33 no.9:19 S '57. (MLRA 10:9)
(Minsk--Flower shows)

GALAVANOV, V. V.

USSR/Physical Chemistry - Crystals. B-5

Abs Jour : Referat Zhur - Khimiya, No 1, 1958, 256

Author : V.V. Galavanov.
Inst :
Title : On the Width of Forbidden Zone of InSb.

Orig Pub : Zh. tekhn. fiziki, 1957, 27, No 4, 651-655

Abstract : A theoretical analysis was carried out in order to explain the peculiarities of the temperature dependence of the electrical conductivity and Hall's constant of semiconductors with a great ratio of electron and hole mobility was carried out. The derived theoretical equations were used for the interpretation of results of the determination of the optical and electrical widths of the forbidden zone of InSb.

Card 1/1

AUTHORS Vinogradova, K.I., Galavanov, V.V., Nasledov, D.N., 57-9-9/40

TITLE The Preparation of Indium Antimonide of High Purity by the Method of Zone Melting.
(Poluchenive sur'myanistogo indiya vysokoy stepeni chistoty metodom zonnoy plavki - Russian)

PERIODICAL Zhurnal Tekhn. Fiz.,1957,Vol 27,Nr 9,pp 1976-1984,(U.S.S.R.)

ABSTRACT The results obtained by the purification of indium antimonide according to the method of zone melting are discussed. Purification was carried out in soldered quartz tubes which were filled with argon. The liquid zone was produced by means of an electric furnace into which a copper cylinder was placed for the purpose of maintaining a uniform temperature in the zone and a great temperature drop at the ends of the zones. The length of the liquid zone was 5 . 5o mm. The displacement velocity of the liquid zone was o,1-1 mm. The ingot diameter was 4-7mm, its length amounted to 15o-35o mm. The distribution of the admixtures according to the length of the ingot was checked by measuring Hall's constant at the temperature of liquid nitrogen. It was found that in the case of the samples under investigation the purest domain was that which was located in the center of the ingot. Samples with an admixture concentration of up to $2,5.10^{-3}$, a mobility of electrons in them of up to 4oo ooo at 77°K and about 1oo ooo $cm^2/V.$ sec at 3oo°K were obtained. The output samples had the conductivity of the p-type. After zone melting

Card 1/2

The Preparation of Indium Antimonide of High Purity 57-9-9/40
by the Method of Zone Melting.

individual ingot domains were found to have the conductivity of the n-type. The admixture concentration according to the length of ingots changes in accordance with the exponential law.The distribution coefficient k amounted to 1,3 in some admixtures and to o,8 in others.
There are 7 figures, 2 tables, and 4 Slavic references.

ASSOCIATION Leningrad Physical-Technical Institute AN USSR
(Leningradskiy fiziko-tekhnicheskiy institut AN USSR)

SUBMITTED March, 14, 1957
AVAILABLE Library of Congress
Card 2/2

VINOGRADOVA, K.I.; GALAVANOV, V.V.; NASLEDOV, D.N.; SOLOV'YEVA, L.I.

Production of extremely pure InSb single crystals by means of zone melting. Fiz. tver. tela 1 no.3:403-406 Mr '59.
(MIRA 12:5)

1.Fiziko-tekhnicheskiy institut AN USSR, Leningrad.
(Indium antimonide crystals)

GALAVANOV, V.V.

Displacement of atoms in a solid under the action of γ-rays. Fiz. tver. tela 1 no.3:432-441 Mr '59. (MIRA 12:5)

1.Leningradskiy fiziko-tekhnicheskiy institut.
(Gamma rays) (Crystal lattices)

VOLOKOBINSKAYA, N.I.; GALAVANOV, V.V.; NASLEDOV, D.N.

Electric and galvanomagnetic properties of high-purity InSb. Fiz. tver.tela 1 no.5:755-760 My '59. (MIRA 12:4)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Indium antimonide)

67302

9.4160
~~9(6)~~ SOV/181-1-8-7/32

AUTHORS: Galavanov, V. V., Yerokhina, N. A.

TITLE: Production of a Valve Photocell of InSb With Fused n-p Junction

PERIODICAL: Fizika tverdogo tela, 1959, Vol 1, Nr 8, pp 1198-1200 (USSR)

ABSTRACT: First, reference is made to several previous papers. Investigation was carried out on monocrystalline n-type InSb with an impurity concentration of 10^{13} to 10^{17} cm^{-3}. For the first time cadmium was used as alloy metal. A conductivity type inversion is possible also in fusing indium to n-type InSb. This fusing is brougth about in graphite containers in an argon atmosphere or in vacuo (10^{-4} to 10^{-5} torr). After fusion the existence of the p-n-junction was concluded from the sign of the thermo-electromotive force. The fused junction of Cd with InSb had a hole-type conductivity. In indium a p-type conductivity was observed at the boundary between n-type InSb crystal and In-InSb alloy. The electric contacts were made by soldering the electrodes to the alloy of InSb with Cd (or In) and to an InSb crystal with tin. Tungsten rubbing contacts were also used. The elements thus prepared were illuminated by intermittent light

Card 1/3

Production of a Valve Photocell of InSb With Fused n-p Junction

from a projector lamp (340 w) or from a silit resistor heated up to 1000°. The light beam fell upon the photocell on the side of the InSb-Cd (or In) alloy or also from the opposite side. In both cases the alloy of InSb with Cd (or In) became charged positively. The variable signal coming from the photocell was the transmitted to a broad-band amplifier of the 28-IM type. The photocells thus produced have a considerable light sensitivity. The photo-electromotive force depends on crystal surface working and also on fusion method (temperature, duration of fusion). Photocells produced at 330 - 340°C (for Cd) and at 380 - 420°C (for In) and at a fusion time of 5 to 10 minutes were the most sensitive ones. In the case of illumination by means of one of the above light sources, the photo-electromotive force was 50 to 60 mw at 77°K. A graph shows the temperature dependence of the photo-electromotive force for 3 samples with various donor concentrations. The purer the sample the lower the temperature at which the sharp drop of the photo-electromotive force begins. At low illumination intensities, the photo-electromotive force depends linearly on this quantity and tends to saturation in the case of high illumination intensities. The

Card 2/3

SOV/181-1-8-7/32

Production of a Valve Photocell of InSb With Fused n-p Junction

discussed n-p junctions have a weakly rectifying effect. The voltampere characteristics for two photocells ascertained at the temperature of liquid nitrogen and direct current by means of the probe method are illustrated in a graph. The rectification coefficient is 3 to 4. The authors thank the leader of the laboratory D. N. Nasledov for his interest in the present work and for some useful advice. There are 4 figures and 7 references, 1 of which is Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR
(Leningrad Institute of Physics and Technology of the AS USSR)

SUBMITTED: July 30, 1958

Card 3/3

S/181/60/002/01/14/035
B008/B011

9.4300
24.7600

AUTHOR: Galavanov, V. V.

TITLE: On the Voltage Sensitivity of Hall-emf Transmitters

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 1, pp. 62 - 64

TEXT: The author discusses the problem of determining the parameters of the material used for the production of Hall-emf transmitters. These parameters should secure the admissible temperature coefficient with a maximum sensitivity of the transmitters. In substances used for the production of the said transmitters (Ge, InAs, InSb) the impurities are completely ionized in a wide temperature range (N=concentration of the ionized donor impurities). The minimum value of N must be selected in such a way that the temperature coefficient of the transmitter sensitivity does not exceed a given value. The N_{min} value satisfying these requirements is easily determinable from the known quantities b and n_i, provided that A and N be independent of the temperature in the respective range (b - ratio of the mobility of electrons u_1 to the

Card 1/3

On the Voltage Sensitivity of Hall-emf Transmitters

S/181/60/002/01/14/035
B008/B011

mobility of holes $u_2 \left(b = \frac{u_1}{u_2} \right)$; n_i - carrier concentration in the range of the natural conductivity of crystals; A - constant parameter, the value of which depends on the diffusion mechanism of the carriers in the crystal, and which may vary between 1 and 1.93. A formula is given for the calculation of N_{min}. The values calculated from this formula along with a great number of other parameters are tabulated for Ge, InAs, and InSb. When feeding the transmitters with alternating current it is expedient to utilize InSb and InAs. These substances have a low resistivity, and there is the possibility of connecting a transformer with a high ratio to the current source. Small constant and alternating magnetic fields can be measured therewith. In principle, the sensitivity of the transmitters can be increased in certain cases by applying substances, with the working temperature of the transmitter being dropped to 100-70°K. The sensitivity of an InSb transmitter with a concentration of impurity ions of 10^{13} cm^{-3} amounts to 20,000 μv/oe below 120°K. This is 400 times the amount of sensitivity found at room temperature. It must be noted in this connection that the Hall

On the Voltage Sensitivity of Hall-emf Transmitters

S/181/60/002/01/14/035
B008/B011

constant is entirely independent of temperature. The author thanks D. N. Nasledov for interest displayed. There are 1 table and 4 references: 3 Soviet and 1 German.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Institute of Physics and Technology AS USSR)

SUBMITTED: April 8, 1959

Card 3/3

30950
S/576/61/000/000/007/020
E036/E162

24.7600 (1137, 1164, 1454)

AUTHORS: Volokobinskaya, N.I., Galavanov, V.V., and Nasledov, D.N.

TITLE: Investigation of galvano-magnetic phenomena in high purity InSb

SOURCE: Soveshchaniye po poluprovodnikovym materialam, 4th. Voprosy metallurgii i fiziki poluprovodnikov; poluprovodnikovyye soyedineniya i tverdyye splavy. Trudy soveshchaniya. Moscow, Izd.-vo AN SSSR, 1961. Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova. Fiziko-tekhnicheskiy institut. 55-69

TEXT: InSb is a particularly convenient material to use in the study of galvanomagnetic effects in strong and weak fields, because the extremely high electron mobility of $10^5 - 10^6$ cm^2/sec enables strong field conditions to be achieved for field intensities of ~10,000 oersted, which are available normally in the laboratory. p-type material behaves quite differently from n-type in a magnetic field, because the hole mobility is 20-100 times less than that of electrons. Studies in the transition region from impurity- to

Card 1/6

Investigation of galvano-magnetic ...

intrinsic-conduction will not only widen knowledge of the processes in InSb, but also contribute to the development of the theory of galvanomagnetic phenomena. In spite of this, no work has been reported on InSb with impurity concentrations below 10^{14} cm^{-3}, with the exception of a recent paper by E.H. Putley (Ref.11: Proc. Phys. Soc., 1959, Vol.73, 1, 128; 1959, Vol.12, 2, 280). In the present paper, results of measurements are reported on n- and p-type InSb with impurity concentrations from 10^{12} to 10^{18} cm^{-3}. The Hall constant and conductivity were determined in the range 77 to 450 °K for field strengths of 50 - 25,000 oe. The six p-type and eleven n-type samples, cut from zone-refined ingots, included both single and poly-crystalline samples. The apparatus for carrying out the measurements from 77 to 450 °K is very briefly described. The usual log R and log σ against 1/T plots are given for the samples, where R is the Hall constant and σ the conductivity, T being the temperature in °K. Two p-type samples had a marked temperature dependence, unlike the others which, in the impurity conduction range, had a constant σ and R. The impurity atom activation energies determined for these

4

Investigation of galvano-magnetic ...

samples were 0.03 and 0.08 eV, of an order higher than those observed by other workers. The n-type samples show a smooth transition from impurity- to intrinsic conduction in the log R - I/T curves, whilst the p-type samples change sign and then increase rapidly in absolute value of R before decreasing slowly. In this latter region R for p-type samples is larger than R_i (the Hall constant for intrinsic samples), and for n-type samples it is smaller than R_i. Similarly in this temperature range (i.e. above the transition point) the conductivity of n-type samples is larger than, and that of p-type less than, σ_i, where σ_i is the electrical conductivity in the intrinsic range. This behaviour, which leads to an apparent difference in the energy gaps of n- and p-type samples, can be explained by the large mobility ratio of electrons and holes in InSb, as has been shown by V.V.Galavanow (Ref.14: Zh.tekhn.fiz., 1957, Vol.27, No.4, 651). With pure crystals far from the transition region both n- and p-type sample Hall constants coincided with R_i over a fairly wide temperature range. Assuming degeneracy is absent, the energy gap can thus be found from the slope of log $(R_i T^{3/2})$ against I/T.

4

Investigation of galvano-magnetic ...

The value of 0.26 eV obtained agrees well with those quoted in the recent literature. Curves of magneto-resistance against I/T show a maximum value of $\Delta\rho/\rho_0$, $\Delta\rho$ being the change in the resistivity ρ_0 in a magnetic field, at a temperature near the transition from impurity- to intrinsic conduction. As the magnetic field H is increased, the maximum is displaced towards higher temperatures. The Hall constant depends strongly on the magnetic field in both the intrinsic- and impurity conduction ranges. The behaviour in the transition region has been extensively studied but the conduction region has not been investigated very thoroughly, especially at low impurity concentrations. Here, measurements at 77 °K are reported in detail. To avoid complications from the Nernst-Ettingshausen effect the samples were completely immersed in liquid nitrogen. One sample was measured up to 25,000 oe but the others up to only 8,500 oe. Magneto-resistance is also measured as a function of magnetic field at this temperature. $\Delta\rho/\rho_0$ proportional to H^2 only for H < 200 oe; for H ~500-2,000 oe the relation is linear; above 2,000 oe it approaches saturation. In a field of 8,500 oe the resistance change was 500-700%. Control experiments showed that the

Card 4/6

4

Investigation of galvano-magnetic ...

variation of R and $\Delta\rho/\rho_0$ did not depend on surface condition or the magnitude of the current through the sample. The change in R with the field for p-type samples was significantly less than for n-type samples. For the transition region from impurity- to intrinsic conduction these results are in qualitative agreement with the theory for strong fields. Any peculiarities in behaviour are related to the mobility ratio and the fact that at 1000 oe the electrons are already in strong field conditions, whilst the holes are still in weak field conditions. The maximum in the $\Delta\rho/\rho_0$ curve against temperature for p-type samples is related to the predominance of low mobility holes below the transition point and of high mobility electrons above it. As the temperature increases further the mobility decreases to give a reduction in $\Delta\rho/\rho_0$. Theoretical difficulties do arise over the dependence of R and $\Delta\rho/\rho_0$ on H in the impurity conduction range. For p-type material the changes of R and $\Delta\rho/\rho_0$ do not exceed that predicted by theory, but for n-type the discrepancy is very large, the observed changes being markedly greater than expected. In pure n-type samples, R decreased 3 - 8 times, and changed by 500 - 700% for a change in H of 50 to 25,000 oe. Even for

Card 5/6

4

Investigation of galvano-magnetic ...

p-type material the changes are observed at much smaller fields than expected from considerations of mobility, i.e. at $H > 60$ oe instead of $H > 10^3 - 10^4$ oe. These results lead to difficulties in determining carrier concentrations and mobility from Hall constant and conductivity measurements. The results are, however, regarded as preliminary and further investigation of surface treatment, crystal orientation in the magnetic field, etc. is required. There are 11 figures, 1 table and 20 references: 3 Soviet-bloc, 1 Russian translation from non-Soviet-bloc publication, and 16 non-Soviet-bloc. The four most recent English language references read as follows:

Ref.5: C. Hilsum, R. Barrie. Proc. Phys. Soc., 1958, Vol.71, 460, 575.
Ref.6: C.H. Champness, J. Electronics Control, 1958, IV, 3, 201.
Ref.11: as in the text above.
Ref.20: H.P.R. Frederikse, W.R. Hosler, [illegible] 5, 1135.

Card 2

29688 S/181/61/003/010/010/036
B102/B108

9,4170 (1051,1035,1482)

AUTHORS: Galavanov, V. V., Kartuzova, I. A., and Nasledov, D. N.

TITLE: Measurement of the diffusion length of minority carriers in InSb

PERIODICAL: Fizika tverdogo tela, v. 3, no. 10, 1961, 2973 - 2980

TEXT: Since the characteristics of InSb infrared receivers depend considerably on the minority-carrier lifetime τ (or their diffusion length L), measurement of these quantities is of great interest. The authors used the Waldes method to determine L and τ in n- and p-type InSb single crystals having impurity concentrations between 10^{12} and 10^{16} cm^{-3}. L was determined by the Waldes light-probe method. For weak illumination intensities, when the collector photo-emf V $<$ kT/5e (e - electron charge), V is proportional to the light-induced minority carrier concentration. When the surface recombination rate is small, $V = V_0 \exp(-x/L)$ in the dark (x - distance from the illuminated region). This relation holds for one-dimensional geometry. In axisymmetric geometry $V = V_0 \exp(-x/L)/\sqrt{x}$. It was to be found experimentally which of these formulas has to be applied.

Card 1/64

Measurement of the diffusion...

The 0.2 - 2 mm thick test pieces were polished and then etched with CP-4A (SR-4A). They were placed in a vacuum cryostat with an NaCl window. The light incident on the specimen was interrupted by an 800-cps chopper. A tungsten or phosphor-bronze point served as a collector contact; a 28-IM (28-IM) amplifier was used to measure the variable photo-emf on it. The measurements were made between 100 and 200°K. The carrier concentration in the specimens at 77°K was determined from the Hall effect, L was determined from the inclination of the straight line $\log V = f(x)$. τ was determined from $\tau = L^2/D$ where

$$D = D_p \frac{b\left(1 + \frac{p_0}{n_0}\right)}{b + \frac{p_0}{n_0}}, \qquad (4)$$

$D_p = u_p kT/e$ being the hole diffusion coefficient, $b = u_n/u_p$, the mobility ratio, p_o and n_o the equilibrium concentrations. For intrinsic conductivity $D = 2bD_p/(b+1)$. In the case of impurity conductivity, $D = D_p$ for n-type, and $D = D_n = u_n kT/e$ for p-type specimens. The carrier concentration in the intrinsic-conductivity region of InSb is given by

Card 2/4

$n_i \approx 6 \cdot 10^{14} T^{3/2} \exp(-1510/T)$. The temperature dependence of τ can be seen in Fig. 4. When temperature drops from 170 to 120°K, τ decreases to less than one hundredth its value. In this range the temperature dependence of τ obeys the Shockley-Reed law. It is shown that the experimental curves $\tau = f(1/T)$ agree with the formula

$$\tau = \frac{2\tau_i n_i}{n_0 + p_0} = \frac{2\tau_i n_i}{\sqrt{4n_i^2 + N_{n,p}^2}}, \qquad (12)$$

which holds for a neutral crystal and radiative recombination. $N_{n,p}$ are the majority-carrier concentrations in an n- or p-type crystal in the region of impurity conductivity. $\tau = 2\tau_i n_i / N_{n,p}$ holds for the impurity-conductivity region ($n_i \ll N_{n,p}$). The straight line corresponding to Auger recombination is too steep. Results: (1) No correlation was found between L and the impurity concentration. (2) The data agree with the radiative-recombination theory for $b \approx 600 - 700$. (3) The difficulties arising in the interpretation of the results may be due to an inaccurate measurement of L and an inaccurate calculation of τ_i. There are 5 figures, 1 table, and 24 references: 9 Soviet and 15 non-Soviet. The three most recent refer-

Card 3/4

ences to English-language publications read as follows: R. A. Laff, H. Y. Fan. Phys. Rev. 121, 53, 1961; R. T. Landsberg, A. R. Beattie. J. Phys. Chem. Sol., 8, 73, 1959; R. N. Zitter, A. J. Strauss, A.E.Attard. Phys. Rev., 115, 266, 1959.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR Leningrad (Physicotechnical Institute imeni A. F. Ioffe AS USSR, Leningrad)

SUBMITTED: April 28, 1961

Legend to the Table: (1) Number of the specimen, (2) voltage.

№ образца (1)	p_0, см$^{-3}$	n_0, см$^{-3}$	u_n, см^2/в · сек.	u_p, см^2/в · сек.	ε (2)
13p1.4	$1.4 \cdot 10^{13}$	—	$9 \cdot 10^4$	$9 \cdot 10^2$	100
13p1	$1 \cdot 10^{13}$	—	$1.5 \cdot 10^5$	$3 \cdot 10^3$	50
15p5	$5 \cdot 10^{15}$	—	$2 \cdot 10^5$	$4 \cdot 10^3$	50
16p1	$1 \cdot 10^{16}$	—	$6 \cdot 10^4$	$2 \cdot 10^3$	30
12n2	—	$2 \cdot 10^{12}$	$7 \cdot 10^4$	10^2	700
13n2	—	$2 \cdot 10^{13}$	$2 \cdot 10^5$	$3 \cdot 10^2$	650
13n3	—	$3 \cdot 10^{13}$	$4.5 \cdot 10^4$	10^3	45
14n6	—	$6 \cdot 10^{14}$	$1.2 \cdot 10^5$	$2 \cdot 10^3$	60

Card 4/5 4

MAMAYEV, S.; NASLEDOV, D.N.; GALAVANOV, V.V.

Electric properties of the semiconducting solid solutions $xCdSnAs_2 - y(2\ InAs)$. Fiz.tver.tela 3 no.11:3405-3413 N '61. (MIRA 14:10)

1. Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR, Leningrad. (Solutions, Solid) (Semiconductors--Electric properties)

24760

S/181/62/004/006/047/051
B108/B138

AUTHORS: Vinogradova, K. I., Galavanov, V. V., and Nasledov, D. N.

TITLE: Dependence of carrier mobility on the impurity concentration in InSb crystals

PERIODICAL: Fizika tverdogo tela, v. 4, no. 6, 1962, 1673 - 1674

TEXT: The authors studied this problem as little information has been available. Measurements were made at 77 and 300°K. The hole mobilities at both temperatures are virtually the same; they decrease with increasing impurity concentration. Electron mobility decreases slightly with increasing impurity concentration at 77°K. At 300°K it remains constant up to 10^{16} cm^{-3}, but at higher concentrations it decreases and approaches the same value as at 77°K. At low temperatures mobility is chiefly determined by the scattering of electrons from holes and phonons. There are 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR Leningrad (Physicotechnical Institute imeni A. F. Ioffe AS USSR, Leningrad)

Card 1/2

Galvanomagnetic properties of indium antimonide doped with elements from the first and second groups, in the temperature interval 4.2 to 300°K. K. I. Vinogradova, D. N. Nasledov, Yu. G. Popov, Yu. S. Smetannikova.

Electrical properties of doped crystals of indium antimonide in a wide range of temperatures and impurity concentration. V. V. Galavanov, D. N. Nasledov, A. S. Filipchenko.
(Presented by V. V. Galavanov--15 minutes).

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

GALAVANOV, V. V.; KARASEVA, N. L.

Hall coefficient as dependent on the magnetic intensity in InSb crystals doped with Se. Fiz. tver. tela 5 no.1:36-40 Ja '63. (MIRA 16:1)

1. Fiziko-tekhnicheskiy institut imeni A. F. Ioffe AN SSSR, Leningrad.

(Hall effect) (Indium antimonide crystals)
(Magnetic fields)

GALAVANOV, V.V.; YEMEL'YANENKO, O.V.; KESAMANLY, F.P.

Electron effective mass in InSb with degenerate electron gas.
Fiz. tver. tela 5 no.2:616-618 F '63. (MIRA 16:5)

1. Fiziko-tekhnicheskiy institut imeni A.F.Ioffe AN SSSR, Leningrad i Institut fiziki AN AzSSR, Baku.
(Indium antimonide) (Electrons)

GALAVANOV, V.V.; ZIYAKHANOV, U.; NASLEDOV, D.N.

Electron-hole junctions in p-InSb. Fiz. tver. tela 5 no.10: 3048-3050 O '63. (MIRA 16:11)

1. Fiziko-tekhnicheskiy institut im. A.F. Ioffe AN SSSR, Leningrad.

L 12855-63 EWT(l)/EWG(k)/BDS/EEC(b)-2 AFFTC/ASD/ESD-3 Pz-4
AT/IJP(C)
ACCESSION NR: AP3003719 S/0109/63/008/007/1187/1192

AUTHOR: Galavanov, V. V.; Nasledov, D. N.; Rzayev, M. A.

TITLE: Volt-ampere characteristics of alloyed p-n junctions in InSb

SOURCE: Radiotekhnika i elektronika, v. 8, no. 7, 1963, 1187-1192

TOPIC TAGS: diode, volt-ampere characteristics, p-n junction, diode alloy, InSb diode, Shockley theory

ABSTRACT: The effect of temperature variation (78 to 150K) on the volt-ampere characteristics of an alloy type p-n junction in InSb was investigated. The junctions were prepared on n-type InSb crystals with a donor impurity concentration from 3×10^{14} to $3 \times 10^{16}/cm^3$ by alloying either with In or In with cadmium impurities. The area of the p-n junction was between 2×10^{-2} to $4 \times 10^{-2}/cm^2$. The volt-ampere characteristics obtained by direct current for the specimen before and after etching in the SR-4 etching bath at 78K show that reverse current decreases by 1.5 orders of magnitude after etching, while forward current does not change at voltages over 0.13 v. Rectification is absent below 0.12 v for the specimen which is not etched. This is explained by a small shunting resistance (180 ohm) in the specimen surface layer, which does not depend on the voltage

Card 1/2

L 12855-63
ACCESSION NR: AP3003719

applied, and is 10,000 ohms for the etched specimen. It was concluded that this resistance determines the inverse p-n junction characteristics. The study of volt-ampere characteristics at various temperatures shows that both reverse and forward currents increase with increasing temperature. The β-coefficient in the expression for the straight part of the volt-ampere characteristics which appears in the Shockley theory varies between 1 and 2. The value of the cutoff voltage as well as its temperature dependence characteristic coincides with the contact potential difference. The β-coefficient and other data obtained in these experiments agree qualitatively with the Shockley and Sah-Noyce-Shockley theories. Orig. art. has: 6 figures, 1 table, and 5 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR (Physicotechnical Institute, AN SSSR)

SUBMITTED: 12Jun62 DATE ACQ: 02Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 000 OTHER: 010

Card 2/2

L 18388-63 EWP(q)/EWT(m)/BDS AFFTC JD
ACCESSION NR: AP3003732 S/0109/63/008/007/1280/1281

58
57

AUTHOR: Galavanov, V. V.; Lebedev, A. A.; Rzayev, M. A.

TITLE: Capacitance of alloy p-n junction in InSb

SOURCE: Radiotekhnika i elektronika, v. 8, no. 7, 1963, 1280-1281

TOPIC TAGS: capacitance, InSb junction

ABSTRACT: Results are reported of an experimental determination of capacitance of a p-n junction obtained by alloying In into n-InSb. Single crystals of InSb with donor-impurity concentrations of 3×10^{14}, 2×10^{15}, and 2×10^{16} cm^{-3} were used as a source material. The p-n junction area was 0.02 cm^2. Thirty samples were measured at the liquid-nitrogen temperature, at 50-1,000 kc. The capacitance was found to depend on the frequency and smoothness of the junction surface. "In conclusion, we consider it our pleasant duty to thank D. N. Nasledov for his interest in this work." Orig. art. has: 2 figures and 1 formula.

Card 1/2

L 18388-63
ACCESSION NR: AP3003732

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR (Physicotechnical Institute, AN SSSR)

SUBMITTED: 19Oct62 DATE ACQ: 02Aug63 ENCL: 00

SUB CODE: GE NO REF SOV: 000 OTHER: 006

Card 2/2

VINOGRADOVA, K.I.; GALAVANOV, V.V.; NASLEDOV, D.N.

Obtaining ultrapure InSb crystals by the zone melting method. Fiz. met. i metalloved. 16 no.3:385-393 S '63. (MIRA 16:11)

1. Fiziko-tekhnicheskiy institut imeni A.F. Ioffe.

L 38865-66

ACC NR: AR6015905 (A) SOURCE CODE: UR/0081/65/000/022/B018/B018

AUTHOR: Alferov, Zh. I.; Galavanov, V. V.; Zimogorova, N. S.; Kazarinov, R. F. 56 B

TITLE: Recombination radiation from the p-n-n$^+$ structure in indium antimonide 27 27

SOURCE: Ref. zh. Khimiya, Abs. 22B91

REF SOURCE: Tr. Komis. po spektroskopii. AN SSSR, vyp. 1, 1964, 503-507

TOPIC TAGS: indium antimonide, recombination radiation, semiconductor carrier

ABSTRACT: The spectral distribution of recombination radiation from the p-n-n$^+$ structure in indium antimonide was studied. The p-n-n$^+$ structures were obtained by fusing indium and tin into n-type indium antimonide of high purity. The dependence of the intensity and spectral distribution of the recombination radiation on the concentration of the injected carriers was investigated. Authors' abstract. [Translation of abstract].

SUB CODE: 20

Card 1/1

ACCESSION NR: AP4013531 S/0181/64/006/002/0625/0627

AUTHOR: Galavanov, V. V.

TITLE: Concerning the paper of I. M. Tsidil'kovskiy "The scattering of electrons and holes in doped InSb, InAs, and GaAs" (FTT, 4, 2539, 1962)

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 625-627

TOPIC TAGS: electron scattering, hole scattering, concentration band, Fermi level, optical vibration

ABSTRACT: The author considers Tsidil'kovskiy's conclusion that for a parabolic conduction band the mobility of electrons, limited by scattering at ion impurities in the zone of weak degeneracy (Fermi level of 4 or less), increases with concentration of ion impurities. He tabulates the values of $F_2/F_{\frac{1}{2}}^2$, which varies as the mobility, according to position of Fermi level, and he shows that the mobility, instead of increasing, steadily decreases with increase in Fermi level. Furthermore, he points out that, in considering the nonparabolic character of the conduction band in InSb, Tsidil'kovskiy has neglected to take into account the

Card 1/2

ACCESSION NR: AP4013531

dependence of the effective mass of electrons on energy in such a band. Tsidil'kovskiy maintains that scattering at optical vibrations of the lattice increases with increase in impurity concentration, but the author denies this and emphasizes the increasing role of impurity scattering. He states that optical vibration has considerable effect on the scattering of holes in InSb and cannot be neglected, as has been done by Tsidil'kovskiy. Orig. art. has: 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR)

SUBMITTED: 16May63 DATE ACQ: 03Mar64 ENCL: 00

SUB CODE: EC, SS NO REF SOV: 005 OTHER: 001

Card 2/2

ACCESSION NR: AP4013539 S/0181/64/006/002/0644/0645

AUTHORS: Alferov, Zh. I.; Galavanov, V. V.; Zimogorova, N. S.; Kasarinov, R. F.

TITLE: Recombination radiation of p-n-n$^+$ structure in indium antimonide

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 644-645

TOPIC TAGS: recombination, radiation, recombination radiation, p n n$^+$ structure, indium antimonide, spontaneous recombination radiation, spectral distribution, forbidden zone, current carrier, current carrier concentration, current density, radiation intensity

ABSTRACT: The authors have made several experiments on spontaneous recombination radiation, at temperatures near the temperature of liquid nitrogen, from the p-n-n$^+$ structure of indium antimonide. The samples were n-type single crystals with $n = 3 \cdot 10^{14}$ cm^{-3}, $\mu_n = 230\,000$ cm^2/v·sec and $n = 2 \cdot 10^{15}$ cm^{-3}, $\mu_n = 200\,000$ cm^2/v sec (at the temperature of liquid nitrogen). The width of the middle n-layer was 150-200 microns. The current carrier concentration in the highly doped zones was $5 \cdot 10^{17}$ cm^{-3} in the p zone and above 10^{17} cm^{-3} in the n-zone. The spectral distribution for recombination radiation proved to be almost symmetrical with a maximum at

Card 1/2

ACCESSION NR: AP4013539

an energy of about 0.215 ev. The width of the forbidden zone, determined from the edge of the recombination radiation spectrum, was 0.200 ev, which agrees well with theory for that temperature (130K). The spectrum of recombination radiation for materials with lower carrier concentration was always somewhat below the spectrum of the first sample. This is undoubtedly due to the beginning of degeneracy in the latter. Preliminary studies indicate a linear relation between current density and intensity of radiation. "The authors sincerely thank Professors V. M. Tuchkevich and D. N. Nasledov for their constant interest in the work, and they thank Ye. A. Gamilko for his aid in preparing the samples." Orig. art. has: 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute AN SSSR)

SUBMITTED: 07Oct63 DATE ACQ: 03Mar64 ENCL: 00

SUB CODE: PH NO REF SOV: 001 OTHER: 002

Card 2/2

L 10771-65 EWT(m)/EWP(b) IJP(c)/AFWL/ESD(gs)/SSD/ESD(t)/AS(mp)-2/RAEM(a)/ASD(a)-5 JD

ACCESSION NR: AP4044939 S/0181/64/006/009/2683/2688

AUTHORS: Galavanov, V. V.; Nasledov, D. N.; Filipchenko, A. S.

TITLE: Investigation of the mechanism of electron scattering in pure and doped InSb crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2683-2688

TOPIC TAGS: indium antimonide, electron scattering, Hall coefficient, electrical conductivity, single crystal, conduction band, carrier mobility

ABSTRACT: Measurements of the electrical conductivity σ and the Hall coefficient R of n-type InSb single crystals containing 4×10^{15} - 7×10^{18} cm^{-3} impurities were made in the temperature range 77--773°K. The properties of the samples, the method, and the results are given in an earlier paper of the authors (Izv. AN SSSR, ser. fiz., v. 28, 959, 1964). The results were in agreement with Kolodziejczak's

Card 1/3

L 10771-65

ACCESSION NR: AP4044939

theory (Bull. Acad. Polon. Sci., ser. math., astr., phys. v. 9, 293, 1961; Acta Physica Polonica v. 20, 379, 1961) which allows for the nonparabolicity of the conduction band. The mobility was calculated for electron scattering by impurity ions, optical and acoustical modes of the lattice vibrations, and holes. The mobility calculated ignoring scattering on the acoustical modes agreed with the experimental data. For the acoustical mode scattering to be important the deformation potential had to be between 10 and 30 v. The insufficient accuracy of the mobility calculations and some anomalies of the Hall coefficient at high temperatures in samples with $n > 10^{18}$ cm^{-3} made it impossible to draw final conclusions about the acoustical-mode scattering. "The authors thank Polish scientists Prof. L. Sosnowski, Docent I. Kolodziejczak, and Dr. R. Kowalczyk for supplying tables of integrals." Orig. art. has: 3 figures, 1 table, and 6 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR,

Card 2/3

L 10771-65

ACCESSION NR: AP4044939

Leningrad (Physicotechnical Institute, AN SSSR)

SUBMITTED: 31Mar64 ENCL: 00

SUB CODE: SS NR REF SOV: 006 OTHER: 011

Card 3/3

L 14046-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/AFETR/ASD(a)-5/ESD/SSD/ASD(1)/
AFWL/RAEM(a)/ESD(gs)/ESD(t) JD

ACCESSION NR: AP4044963 S/0181/64/006/009/2850/2851

AUTHOR: Berkeliyev, A. D.; Galavanov, V. V.; Nasledov, D. N.

TITLE: Lifetime of excess carriers in doped n-typed InSb crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2850-2851

TOPIC TAGS: lifetime, excess carrier, nonequilibrium carrier, indium antimonide, doped indium antimonide, laser, recombination radiation

ABSTRACT: The lifetime of excess carriers in n-type InSb doped with selenium was determined by experimentally obtained data on stationary photoconductivity and the photomagnetic effect. Ohmic contacts were soldered to polished and etched samples of InSb from 20 to 200 μ thick. The samples were illuminated with light at a wavelength of 1.5-2.5μ chopped at the rate of 500 cps. Variations of the photoconductivity and the photomagnetic effect with temperature were identical, indicating the absence of trapping of excess carriers. Variations of the lifetime of excess carriers with temperature for different concentrations of selenium are shown in the figure in the enclosure. Theoretical values calculated on the basis of recombination radiation theory, assuming direct transitions and the absence of degeneracy, are plotted as solid curves. The fact that the experimental data are

Card 1/3

L 14046-65
ACCESSION NR: AP4044963

in good agreement with theoretically calculated data, using rough approximate values for the variables for the effective masses, the width of the forbidden band, and equilibrium concentrations indicates that the main recombination mechanism is radiative recombination. Orig. art. has: 1 figure and 2 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy Institut im. Ioffe AN SSSR (Leningrad Physicotechnical Institute)

SUBMITTED: 11Apr64 ENCL: 01 SUB CODE: SS, IC

NO REF SOV: 001 OTHER: 002

Card 2/3

L 14046-65

ACCESSION NR: AP4044963

ENCLOSURE: 01

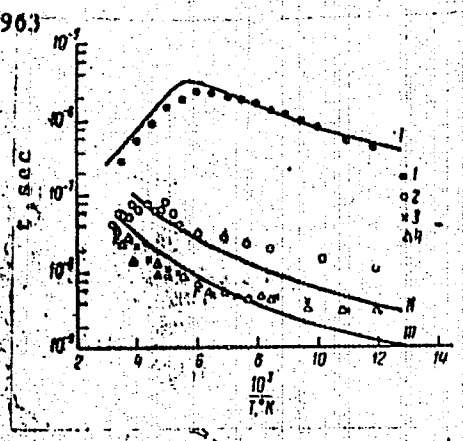

Fig. 1. Temperature dependence of the lifetime of excess carriers. Impurity concentration of: 1 - 7.5×10^{14}, 2 - 1.3×10^{17}, 3 - 2.2×10^{17}, 4 - 3.10^{17} cm^{-3}. I, II, III - theoretically calculated values for impurity concentrations 1, 2, and 4.

Card 3/3

L 11838-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/ASD(a)-5/SSD/AFWL/AS(mp)-2/
RAEM(a)/ESD(gs)/ESD(t) JD
ACCESSION NR: AP4048433 S/0181/64/006/011/3471/3473

AUTHORS: Galavanov, V. V.; Nasledov, D. N.; Filipchenko, A. S.

TITLE: Mobility of electrons in InSb under a mixed scattering mechanism

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3471-3473

TOPIC TAGS: indium antimonide, electron mobility, Hall mobility, electron scattering

ABSTRACT: Supplementing earlier work (Izv. AN SSSR, ser. fiz. v. 28, 959, 1964 and FTT v. 6, 2683, 1964) on the mobility of electrons in n-InSb crystals, the authors show that in the case when the electrons are scattered in the crystal by a mixed mechanism (scattering by the impurity ions and by the optical lattice vibrations) agrees within 10% with the simple formula

Card 1/2

L 14838-65

ACCESSION NR: AP4048433

$$\frac{1}{u_{i+o}} = \frac{1}{u_i} + \frac{1}{u_o} \qquad (1)$$

(u -- mobility, i -- ion, o -- optical), which in turn agrees well both qualitatively and quantitatively with experimental results on the Hall mobility. Orig. art. has: 10 formulas and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute AN SSSR)

SUBMITTED: 04Jun64 ENCL: 00

SUB CODE: SS NR REF SOV: 004 OTHER: 002

Card 2/2

ACCESSION NR: AP4024737 S/0109/64/009/003/0556/0557

AUTHOR: Galavanov, V. V.; Nasledov, D. N.; Rzayev, M. A.

TITLE: Inductivity of InSb diodes

SOURCE: Radiotekhnika i elektronika, v. 9, no. 3, 1964, 556-557

TOPIC TAGS: semiconductor, semiconductor diode, semiconductor diode inductivity, InSb diode, InSb diode inductivity

ABSTRACT: An experimental investigation of the capacitance of alloy p-n junctions in InSb as a function of the positive-bias current is reported. The capacitance was measured in a bridge circuit at 78K. A weak 250-kc signal was applied. It was found that the diode capacitance grows with the forward current up to a certain point; then, the capacitance drops off to zero, at which point the diode exhibits inductive characteristics. The cause of the inductive reaction in the diodes tested has not been clarified as yet. Orig. art. has: 1 figure.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR (Physico-Technical Institute, AN SSSR)

Card 1/1

SUBMITTED: 9 Aug 63

ACCESSION NR: AP4043676 S/0109/64/009/008/1416/1419

AUTHOR: Galavanov, V. V.; Ziyakhanov, U.; Nasledov, D. N.

TITLE: Current-voltage characteristics of p-n junctions with p-InSb base

SOURCE: Radiotekhnika i elektronika, v. 9, no. 8, 1964, 1416-1419

TOPIC TAGS: semiconductor, pn junction, InSb junction, current voltage characteristic

ABSTRACT: Measurement of the current-voltage characteristics in the 78--150K temperature range is reported. Alloy p-n junctions were obtained from p-InSb crystals having an impurity concentration of $(3-5)\times10^{16}$ per cm^3. As addition materials, Sn, Sn+Bi, In+Bi, In+Te, and In+Se were used; the p-n junction area was about 0.5 mm^2. The results obtained — the β coefficient in the forward-branch exponent, the pre-exponential factor I_0, the cutoff voltage U_c, the residual resistance R_r, and the pattern of the forward-current temperature dependence —

Card 1/2

ACCESSION NR: AP4043676

are in good agreement with the Shockley theory of abrupt p-n junctions. At low temperatures, the reverse current grows almost linearly with the applied voltage; apparently, the current is determined by leakage [illegible]. Orig. art. has: 6 figures, 1 formula, and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR (Physico-Technical Institute, AN SSSR)

SUBMITTED: 24Jun63 ENCL: 00

SUB CODE: EC NO REF SOV: 004 OTHER: 001

Card 2/2

ACCESSION NR: AP4041355 S/0048/64/028/006/0963/0968

AUTHOR: Galavanov, V.V.; Filipchenko, A.S.; Nasledov, D.N. (Doctor of physico-mathematical sciences)

TITLE: Electric propertires of doped n-type InSb crystals in a wide range of temperature and impurity concentration [Report, Third Conference on Semiconductor Compounds held in Kishinev 16 to 21 Sep 1963]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.6, 1964,963-968

TOPIC TAGS: semiconductor, electric conductivity, Hall effect, temperature dependence, indium antimonide

ABSTRACT: The electric conductivities and Hall constants of n-type InSb crystals doped with Se were measured in vacuo or in argon at temperatures from 78 to 770°K in an effort to elucidate the mechanism of conduction electron scattering. The crystals were pulled from the melt by the Czochralski method. Crystals having current carrier concentrations at 78°K from 4×10^{15} to 7×10^{18} cm^{-3} were obtained. Clamped tungsten electrodes were employed, and the Hall constants were measured in a 4000 Oe field. The conductivities and Hall constants of all the specimens were nearly independent of temperature below about 200°K. At higher temperatures the conducti-

Card 1/3